

the shell. On the whole, the fossil individuals appear to be more variable than the recent forms. The variations in carination have been recognized to some extent and names have been applied to the most striking of these variations. Seven combinations are apparently possible. These are indicated in the following table:

Tricarinate	<i>tricarinata</i> Say.
Middle carina absent	<i>perconfusa</i> Walker.
Upper and lower carinæ absent	<i>unicarinata</i> DeKay.
Lower carina absent	<i>basalis</i> Vanatta.
Middle and upper carina absent	<i>infracarinata</i> Vanatta.
Middle and lower carina absent	<i>supracarinata</i> Baker.
All carinæ absent	<i>simplex</i> Gould.

VALVATA TRICARINATA SUPRACARINATA n. var.

Shell differing from the other described varieties of the tricarinate series in lacking the carina on the periphery and base. Otherwise similar. Length, 3.5; width, 4.5; aperture length, 2.0; width, 1.8 mm. Topotype, Collection Museum of Natural History, U. of I., No. P928. Type locality, near Morris, Grundy County, Illinois.

This variation is apparently rare, as but four specimens were found in sorting several hundred *tricarinata*. In the deposit under study (Grundy County) the *perconfusa* form was in much greater abundance, followed by the *tricarinata* form. See NAUTILUS, XV, p. 124; XXXI, p. 36; XXVIII, pp. 104, 105, for descriptions of the other variations of this polymorphic species.

SOME CENTRAL AMERICAN SPECIES OF NAIDES, BELONGING OR ALLIED TO THE GENUS ELLIPTIO.

BY A. E. ORTMANN, PH. D.

Frierson (NAUTIL. 27. '13, p. 14) has described a new species as *Unio (Nephronaias) ortmanni*, and says that it "is clearly placed in the *Nephronaias* division by its evident near kinship to *melleus* Lea and to *persulcatus* Lea".

Later (NAUTIL. 31.' 17 p. 47) he distinguishes as *Nephronaias* (s. s.) a group of species, containing *plicatulus*, *persulcatus*, *melleus*, *dysoni*, *ortmanni*, *ravistellus* etc., of which he says that the anatomy resembles that of *Elliptio*, but that it "differs from *Elliptio* in its sulcated disk, in its beak sculpture etc." But it should be remembered that only the anatomy of *ortmanni* was known.

My own determination of the genus *Nephronaias* (Ann. Carn. Mus. 8. '12 p. 326) rested upon the examination of the soft parts of *N. sapotalensis* (Lea), which surely is a *Lampsiline* shell; but I have pointed out that it is all important to determine the position of the *type species* of the genus, *Unio plicatulus* Charpentier. Frierson now assumes, from the characters of the shell, that *plicatulus* has the same anatomical structure as *ortmanni*. This may be correct, but has not been demonstrated; but if correct, the name *Nephronaias* becomes either a synonym of *Elliptio*, or a subgenus of it, or a genus closely allied to it.

In view of the great deficiency in our knowledge of the Mexican and Central American species, I prefer, for the present, to leave those species, which have *Elliptio*-structure, in the genus *Elliptio*. Of the following forms, the anatomy is more or less known to me.

ELLIPTIO ORTMANNI (Frierson) (l. c.).

Specimens, cotypes, from Rio Conchins, Quirigua, Guatemala, have been investigated, collected Febr. 4 and 6, 1913.

Frierson (l. c., p. 15) has already indicated the essential features of the anatomy of this species. It should be added, that the anal opening has crenulations, the branchial papillae; that the mantle connection between anal and supraanal is moderate (in most of my specimens torn by rough handling); that the posterior margins of the palpi are connected for about half of their length. The inner lamina of the inner gills is free from the abdominal sac, except at its anterior end. The marsupium is in the outer gills, placentae are present, sublanceolate, not very solid. Marsupium moderately swollen, its edge remaining sharp, when charged. *Glochidium* subcircular, L. 0.23, H. 0.22 mm. Color of soft parts (in alcohol) pale. Male

and female shells indistinguishable. The breeding season seems to fall in the winter months of the northern hemisphere.

ELLIPTIO CALAMITARUM (Morelet) (?).

This species has been mentioned incidentally by Frierson (l. c., p. 15) from Rio Blanco, near Livingston, Guatemala, collected Febr. 18, '13, but there is some doubt about the identification; in a recent letter, Frierson thinks that this is *U. dysoni* Lea. I do not want to express an opinion; the specimens investigated by me belong to the same lot, and they have absolutely the *same structure of the soft parts as E. ortmanni*. Also the *glochidia* have the same shape and dimensions: L. 0.23, H. 0.22 mm. The breeding season also is in winter (*glochidia* in February).

ELLIPTIO YZABALENSIS (Crosse & Fischer) (Simpson Descript. Catal. '14, p. 276).

Two specimens, with soft parts, have been sent by A. A. Hinkley, collected Jan. 6, '17, in Saja River, Guatemala (tributary to Rio Dulce, below Lake Yzabal). Both are females, and are gravid, but have not yet formed *glochidia*.

Frierson thinks that these specimens might be a new species, but they agree, in my opinion, quite well with Simpson's description of *yzabalensis*, and very well with v. Martens' figures (Biol. Centr. Amer. Moll. 1900, p. 507, pl. 39, f. 9-11), and in my identification I rely chiefly on 10 and 11 of these figures. Their chief character is the great height of the shell as compared with the length. One of my specimens has white, the other has purple nacre.

The *anatomy* is identical with that of *E. ortmanni* and *calamitarum* in every particular. Of course, the *glochidia* have not been observed.

There is no question that the three above species are closely allied to each other, both in anatomy and shell characters (sulcated epidermis), and I should not be astonished if finally they turn out to be forms of one and the same species.

ELLIPTIO RAVISTELLUS (Morelet). (*Nephronaias rav.* Simpson, '14, p. 283).

Specimens from Lake Yzabal, at Jocolo, Guatemala, are at hand, collected by A. A. Hinkley in January, 1914. Among them are 1 male, and 3 females with soft parts; one of the females is gravid, but has only eggs, no glochidia. Seven others from Lake Yzabal were collected January 9, 1917; among them 1 male, and 6 gravid females, three of them with glochidia.

The identification is undoubtedly correct, and has been made chiefly according to v. Martens (Biol. Centr. Amer. Moll. 1900, p. 516, pl. 38 f. 2). The color of the nacre, in my specimens, varies from white through lead color and pinkish to dull purple. The breeding season seems to be similar to that of the preceding species (eggs and glochidia in January).

The *anatomy* resembles that of *E. ortmanni*, but the posterior margins of the palpi are connected at their bases only, and remarkably enough, the inner lamina of the inner gills, in all specimens before me, is free from the abdominal sac *only for about one-half of the length of the latter* (or very slightly more), while it is connected with it in the anterior half (or slightly less). This is a rather unusual condition in American *Unioninae*. Of course, in this case, this character cannot be regarded as essential, before a larger number of Central American shells have been investigated.

Gills, marsupium, and placentae of the *Elliptio*-type. *Glochidia* absolutely identical with those of *E. ortmanni* and *calamitarum*: L. 0.23, H. 0.22 mm. Color of soft parts (in alcohol) pale, with black pigment in the region of the branchial, anal, and supraanal openings.

NOTES.

DR. PAUL BARTSCH spent part of May and June in the Bahamas and Florida, continuing his studies of *Cerion*.

DR. C. MONTAGUE COOKE, who has been working on the